DOCUMENT RESUME

ED 164 083 PS 009 962

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TITLE	The Family-Oriented Home Visiting Program: A Longitudinal Study.
SPONS AGENCY	Joseph P. Kennedy, Jr. Foundation, Washington, D.C.; National Inst. of Child Health and Human Development (NIH), Bethesda, Md.; National Inst. of Education (DHEW), Washington, D.C.
PUB DATE	[76]
CONTRACT	NE-C-00-0261
GRANT	NICHHD-5-507-HR07087-11
NOTE	27p.
EDRS PRICE	MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS	Disadvantaged Youth; Family Characteristics; *Home Programs; Home Visits; Infants; *Intervention; Longitudinal Studies; *Low Income Groups; Mothers; *Parent Education; Parent Role; *Preschool Children; Preschool Education; Program Evaluation; *Teaching Techniques

ABSTRACT

Fifty-one low-income families, each with a toddler, plus at least one other child under age 5, participated in a 5-year home-based intervention study designed to help mothers become more effective educational change agents. One group received a 9-month treatment specifically designed for the needs and characteristics of the individual families; another received a generic treatment focused chiefly on materials; a third served as a control. Half the experimental mothers had an additional 9-month treatment of less frequent contacts. Mothers and children were pretested on a range of instruments relating to maternal and child competency and posttested at three time points following treatment. Results tended to be modestly positive with mothers and toddlers, although not with the other children. Positive effects, when found, were as great at the third posttest as at the immediate one. The study is discussed in the context of the logistic and methodological issues involved in longitudinal intervention research with low-income families in the 1970's. (Author/SE)

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The Family-Oriented Home Visiting Program:

A Longitudinal Study

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Footnote: This research was supported by a contract with the National Institute of Education (NE-C-00-0261). Funds for the third year of follow-up were provided by the Joseph P. Kennedy, Jr. Foundation and by the National Institute of Child Health and Human Development (Grant 5 507 RR07087-11). This support is gratefully acknowledged. Special thanks are owed to the home visitors and to the families who participated in the study. Ruttle is now at Pacific University, Forest Grove, Oregon. Gray's address is Box 151, George Peabody College, Nashville, Tennessee 37203.

Abstract

Fifty-one low-income families, each with a toddler, plus at least one other child under five, participated in a home-based intervention study designed to help mothers become more effective educational change agents. The treatment was planned to enhance its lasting effect. One group received a nine months' treatment specifically designed for the needs and characteristics of the individual families; another received a generic treatment focused chiefly on materials; a third served as a control. Half the experimental mothers had an additional nine months of less frequent contacts. Mothers and children were pretested on a range of instruments relating to maternal and child competency and posttested at three time points following treatment. Results tended to be modestly positive with mothers and toddlers, although not with the other children. Positive effects, when found, were as great at the third posttest as at the immediate one. The study is discussed in the context of the logistic and methodological issues involved in longitudinal intervention research with low-income familiesi in the 1970's.

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The Family-Oriented Home Visiting Program: A Longitudinal Study

This study had as its purpose the design and experimental test of a home-based intervention program for low-income families in which there were at least two young children. The focus was directed toward enabling mothers to become more effective educational change agents for all their young children.

In the execution of the study the writers encountered many problems which seem endemic to conducting longitudinal research with low-income families: comparability of measurements over time, attrition, and rapid social change coupled with family vulnerability to these changes. These problems are of major importance in evaluating intervention programs for low-income families and their children. Thus, this paper may be seen, in one light, as a case example; it will be so presented in the section on results and implications.

A frequent criticism of intervention programs for young children and their mothers is that the impact tends to fade over time. The present study was planned specifically to maximize any possible lasting effects. It was designed to enable the mother to learn ways of working appropriately with all her young children. What she learned in working with an older child would stand her in good stead later with the younger child. Emphasis could be placed on the development of skills that could be used flexibly with varying ages, such as how to read a story to several children at once. A second emphasis would

be to help the parent to develop for herself, and to take advantage of, support systems helpful in becoming more competent in interactions with her children.

Attention was directed toward certain dimensions of the social an and the inanimate environment: (1) the nature, timing, and appropriateness of inanimate stimulation afforded the young child; (2) reciprocity and contingency in social interactions; and (3) a somewhat orderly provision for basic physical needs. The focus was primarily on the mother as mediator in her children's acquisition of cognitive skills and as a principal determinant in their development of a sense of personal competence. These attributes--cognitive skills and personal competence--have been found to differentiate high and low achievers in academic performance and to correlate positively with socio-economic status (Lewis & Goldberg, 1969; White & Watts, 1973, among others). Our efforts were thus directed at breaking the "downward spiral of poverty" where it seemed most likely to yield to our attack (Caldwell, 1970; Hunt, 1971).

The Design of the Study and the Intervention Program

The study included two somewhat different treatments, plus a control group. One treatment, to be explained later, we labeled Extensive Home Visiting (EHV). A second treatment, which used the same materials but represented a smaller use of human resources, was called Materials-Only Home Visiting (MOHV). After the nine months of the home visits which formed the major intervention of the study, each

of the two treatment groups was further subdivided. One subgroup from each treatment received additional contacts once monthly through another nine months.

The Sample

Sixty-nine families were selected by the following criteria: (1) They were either below or close to the poverty level (defined for a family of four as $4137 per year when the study began). (2) All had one child between 17 and 24 months. (3) All but two had at least one other child of preschool age. (4) Families were not included if the toddler and/or one other child had known organic problems. (5) The mothers were either non-working, or else worked on such schedules that it was possible to be present during the children's waking hours. Fathers were included whenever feasible, but were not a part of the research design. (6) They lived within a reasonable commuting distance of the research center.

Names of possible participants were obtained from public health nurses and from the Public Housing Authority rolls. We attempted to locate all families who appeared to meet our criteria. Those we located were visited by trained workers. Parents were informed that if they agreed to participate they might be chosen for any one of the three groups, the Extensive Home Visiting (EHV), the Materials-Only Home Visiting group (MOHV), or the control group. Our purpose was to insure equivalent motivation for treatment and control parents.

Although the criteria for selection did not appear rigorous it proved impossible to recruit a sufficient number of families for the

study at one time, even though refusals were few. Therefore, families were recruited in three waves, at approximately nine month intervals. The first two waves were randomly assigned to the three groups. Because of greater attrition in the MOHV and the control groups, the third wave was randomly assigned to MOHV and control treatments only. There was an approximately equal number of white and black families, and of male and female toddlers. Forty-eight families had fathers present. The mothers averaged ten years of schooling. The three waves were collapsed for purposes of analysis since there did not appear to be any conspicuous differences in the groups, except that the control group of Wave 1 proved to have in it four toddlers of superior intelligence. This initial superiority of the control children tended to obscure possible effects in that wave.

The Treatment

The Extensive Home Visiting approach was planned in accordance with general principles and techniques developed at the ---------- ---------- (------, Note 1; -------, ------, -------,-------, & -------, Note 2). These were adapted for use with mothers of toddlers. The treatment was planned to be specific to each family, and its particular constellation of children, and to its areas of strength and weakness. Nine general objectives of the treatment for the mothers were developed. These are listed below in the approximate order in which they were emphasized over the nine months:

1. Development of trusting and positive relationships with the

home visitor.

2. Development of a feeling of competence.

3. Development of behavior management skills.

4. Improving of teaching style with young children.

5. Greater ability in organizing the spatial environment to enhance the child's educability.

6. Greater skill in organizing the temporal environment for the same purpose.

7. Increase in the amount of verbal reciprocal behavior between mother and the children in the family.

8. Understanding of individual differences in children.

9. Some understanding of the rudiments of skill development in young children.

The treatment involved inexpensive or homemade materials. The emphasis was not on the specific materials but rather on how they were used. In general, they were ones fairly commonplace in most programs for young children. The actual instructions used are given in a manual for parents and home visitors (------, -------, & -----, Note 3). Effort was made to show the mother how, through such materials, she could provide and effective educational environment for young children. This particular treatment was conducted by two experienced professional home visitors and two paraprofessionals whom they trained.

The Materials-Only Home Visiting treatment used exactly the same materials and instructions, but did not involve the nine major objec-

tives of the other treatment; it was generic rather than specific to a given family. The home visitors were undergraduate and graduate college student volunteers.

The control group received some special attention, although minimal. Four visits were made to each control group family and about six color photographs (Kodak Instamatic) made of the children. Small presents were also given the families. Perhaps most important were our attempts to show genuine appreciation for the willingness of these families to participate over a period of three years, and the parents' feeling they were able to offer some contribution to improving the future lot of other young children like their own.

The Testing Program

Six different instruments were employed through the project. Table 1 indicates the instruments and the times at which each test was given. Two other locally developed instruments were used, but are not reported in the interests of brevity since they did not appear adequately developed to justify their consideration.

For the target child (the toddler) the Bayley was used as a pretest along with a test of receptive language (------, Note 4). Subsequently the Binet was used. The Receptive Language Test (RLT) was used only for the immediate posttest, since it has a ceiling of about 36 months.

Insert Table 1 about here

In families in which there was an older child, the Slosson In-

telligence Test (1963) was administered at each testing for the preschooler.

In the families with an infant the Bayley was administered at the first testing period after the infant reached six months.

Two instruments which involved the mother were administered, the Caldwell Home Observation for the Measurement of the Environment (HOME) (Bradley & Caldwell, 1976), and the Maternal Teaching Style Instrument (MTSI) (------- & --------, Note 5), derived in part from the work of Hess and Shipman (1965).

Results

When the study was planned, a repeated measures analysis of variance was the basic analytic strategy. This was used where possible. It was necessary upon occasion to depart from this plan. For example, the pretest for the toddlers was the Bayley; the first posttest was either the Bayley or the Stanford Binet depending on the age and the competence of the child; all target children were given the Binet for the second and third posttest. As another illustration, the Receptive Language Test was revised between the first and second administrations.

Attrition problems also interfered with the adequacy of the design. Because of the amount of attrition, *t*-tests for independent means and *F* tests for homogeneity of variance were run for the three treatment groups on the pretest Bayley Mental Development Index and on the Cue Labels portion of the pretest administration of the MTSI. The EHV

group had lost seven of an original 27, the MOHV group lost eight of 22, and the control group three of 20. On only one t-test was there a suggestion of a difference between the retained and lost families, on the MTSI for the MOHV group where $p < .08$. On the tests of homogeneity of variance, the probability levels were $p > .17$. The means of the retained families tended to be slightly higher.

Because of unequal attrition across groups, and the general problem of missed tests (four testing periods for three family members) we did an additional analysis. This involved only the control group and that experimental group which we predicted would show the greater effect, the Extensive Home Visiting group. Independent t-tests for the three posttests were used as appropriate. The results of both kinds of analyses will be presented.

The Target Children (Toddlers)

For examination of Binet scores a block design analysis was used, with blocking on high and low pretest Bayley MDI scores. These were divided at the median, 92. Table 2 gives the means and standard deviations. There was a significant gain in Binet scores across the three groups over time, $F(2,70) = 4.70$, $p < .01$. This is possibly due to the fact that at the first posttest many of the children, although technically of an appropriate age for the Binet, could not function effectively, or to test-retest effects. The groups effect was also significant, indicating the superiority of the two experimental groups over the controls. Here, $F(2,35) = 3.95$, $p < .03$.

The groups by trial interaction was not significant, however, which suggests that no differential gain was shown after the first posttest.

Insert Table 2 about here

On the independent t-tests of the Binet scores for EHV and control groups, however, where no blocking occurred, only on the second posttest was significance approached: $t(34) = 1.56$, $p < .06$.

The Receptive Language Test was designed for use with young toddlers. An upward extension was developed before the first posttest. The pretest was thus used as covariate in an analysis of covariance. A mild trend toward a difference was indicated, $F(2,48) = 2.54$, $p < .09$. On an independent t-test EHV scored higher than control as indicated by $t(35) = 1.92$, $p < .05$.

The Preschoolers

No significant differences were found with the preschoolers; indeed the group means on the Slosson Intelligence Test were much alike.

The Infants

There were only 16 infants in the total sample. The Bayley was administered to them approximately 12 months after the pretests of the other family members. The Bayley functions then somewhat as a posttest. The mean for the seven EHV infants was 101 on the Mental Development Index and 103 on the Psychomotor. The five MOHV infants scored 96 and 95 respectively, and the four control infants 109 and 98.

Most of the variance of this final group was carried by one gifted infant. Because of the small N no statistical analyses were used, and no treatment effect was apparent.

The Mothers

On the Caldwell Home Observation for the Measurement of Environment (HOME) a repeated measures analysis of variance for the pretest and the first two posttests was used. For the third posttest a form designed for children 3-6 years was employed. This form has a different number of items and is not strictly comparable. The correlations between the two forms are relatively high, however, according to our data. Table 3 gives the mean scores for the groups.

The first wave of the three groups did not have HOME as a pretest but instead took a test midway in the first year's treatment. These midtest scores are not included in any of the analyses, and thus the N is small. An additional simple analysis of variance was performed for the third posttest. None of these analyses showed significant differences in groups although there was a tendency in the repeated measures analysis for groups to differ, F (2,35) = 2.36, $p < .10$. The group effect for trials was significant, F (2,70) = 3.83, $p < .03$. Because of the small N's for the ANOVAs independent t-tests were performed for the first, second, and third posttests for the EHV and the control groups. For the first posttest, results were not significant. For the second posttest t (33) = 1.63, $p < .06$, and for the third t (33) = 2.06, $p < .03$. The evidence then is consistent, al-

though weak, in indicating a treatment effect.

Insert Table 3 about here

The Maternal Teaching Strategy Instrument yields several scores. The test requires that a mother teach a task to her young child. Previous work with this test (-------, -------, -------, -------, & ------, 1973) suggests that the most useful part of the test for predictive purposes is that of cue labels used by the mother in teaching the child (color, shape, position, and size). In the majority of homes a preschooler was present, and the test was administered with that preschooler. Otherwise the test was given with the toddler. (This tends to obscure results somewhat, since the use of physical direction is more common with younger children but at the same time yields an index of "less efficient" teaching style than does the use of cue labels.) This procedure was followed for the pretest and the first posttest, when an alternate form was used. At the second posttest the original form was used with the target children who were then of appropriate age. At the third posttest period the target children were too old for the task to be appropriate.

The MTSI results for the use of maternal cue labels are presented in Table 4. There was a marked change over trials, with the use of cue labels increasing: F (2,48) = 47.94 with $p < .001$. The groups effect on the repeated measures was not significant. The second posttest with the target child showed a group effect with F (2,48) = 3.19, $p < .05$. On independent t-tests the difference between EHV and controls

on the first posttest approached significance, $p < .07$. On the second posttest t (33) = 2.40, $p < .01$. On the independent t-test of EHV and control groups for the second posttest t (33) = 2.18, $p < .01$. Differences were not significant on the first posttest.

Insert Table 4 about here

Sex Differences

All test scores were examined for sex differences. The halving of the initially small N menat that analyses of variance would probably reveal only gross differences between the sexes. And indeed few differences did emerge, and none either systematic or at a significant level.

Comparisons of the Groups Receiving the Sustaining Treatment with Their Own Controls

The EHV and the MOVH groups had been randomly assigned to two subgroups at the end of the nine months of treatment, with one group receiving no more contacts during the ensuing ten months, the other group monthly contacts. The division of these already small groups, however, made analyses difficult. A five way analysis of variance was run on each test from pretest to third posttest, however, where appropriate (EHV sustaining, EHV control, MOHV sustaining, MOHV control, and the overall control group). Nothing emerged that one could not attribute to chance. Fairly substantial differences were found upon occasion, but the large variances overrode any possible effects. For example, on the Binet the EHV sustained means for posttest three was 97.8, while the EHV non-sustained means was 88.9. The control

mean was 89.1.

Summary of Results

This section has presented the results of the repeated administrations of the various tests of the mothers and children. The results tend to be modest but positive with the mothers and the target-aged children. No effects have been demonstrated with the preschoolers. The original design proved too elaborate and the number of cases too few to make effective tests of some of the original hypotheses. Thus basically, the effect of the "sustaining" treatment was not adequately tested. Neither was it possible to make an effective comparison of the EHV and the MOHV groups. As is hardly surprising, the MOHV group tended to fall between the EHV and control groups, but this was not consistent. The intercorrelations among measures are of some interest, particularly those between mother and child measures over time. It is planned to make these the subject of a subsequent communication.

Discussion

Over the nearly five years in which this project was carried out, it has demonstrated full-length most of the problems one encounters in conducting a field-based longitudinal intervention study one hopes to dignify by the name of research. The study demanded approximately three years of contact with a given wave of low-income families during the 1970's. The extremely vulnerable state of low-income families at any time makes such longitudinal research difficult. The recession, and the unemployment involved, created further instability. Intervention

studies are expensive, particularly longitudinal ones. Economic resources dictated that the study use the smallest number of cases essential to give some chance of demonstrating significant changes in mother and child behavior. So much was invested in a single family that its loss was serious. With the family orientation, our testing battery at each stage was a large one, involving the mother and at least two children. Certain tests were designed for home administration and others for the laboratory. Test scheduling became a major endeavor; again, the vulnerability of low-income families meant many cancellations and occasionally the necessity of dropping a family. Anyone familiar with testing young children over a three year span can imagine the measurement problems we encountered.

Admittedly our study is far from elegant; it has many loose ends. Our number of cases proved too small, and the ages of the non-target children too heterogeneous for effective tests of certain of our hypotheses. We believe, however, that we have addressed ourselves to an important issue in improving the educability of parents and children from low-income homes. On the whole, the findings of the study tend to be positive, albeit on a modest level, at least with the maternal measures and those for the target children.

Perhaps the most interesting finding is the lasting effect of the intervention. In no case were scores at the third and final posttest lower than those for the immediate or second posttest; in fact, there was a slight tendency toward higher scores. This is consistent

with a major aim of the study: to help the mother develop techniques which she could continue to use or to adapt effectively as the child grew older. It is also consistent, although certainly not proven, with the objective of enabling the mother to work effectively with two or more children simultaneously.

It is appropriate to raise the question as to why the results of this study are so modest when compared with certain other studies reported in the literature. For instance, one may look at the well-replicated home-based program of Phyllis Levenstein (Madden, Levenstein, & Levenstein, 1976). The Levenstein studies have shown higher IQ gains, and have indicated a sustaining effect as well. To the writer there seems two possible reasons for the differences. As compared to the Levenstein approach, the current treatment was of shorter duration, consisting of nine months of weekly visits. Levenstein has used seven months for two consecutive years with semi-weekly visits. The Family-Oriented study was broader in its goals and its tests of effectiveness. That is, the mother was tested on two indices, and two children in the family were tested on a range of instruments. Thus, the treatment effect may have been diffused by being spread across three people and different aspects of development. In addition, the participants of the Family-Oriented Study were randomly assigned to treatment and control groups, while most of Levenstein's work has been with a quasi-experimental design. While the Family-Oriented study may have great ecological validity (it dealt with the mother's

situation as it was), such "ecological validity" may militate against obtaining immediate measureable effects except with large samples. This is an important issue in the current emphasis on the ecological context of home intervention studies.

Still, with all the diffuseness of measurement and the many problems of longitudinal studies, the findings achieved a modest level of significance in certain key measures. The treatment was small in terms of actual time involved, only about 30 hourly visits over a period of nine months. If one holds this 30 hours over against the massive problems of families living in poverty, it is small indeed. The period of the economic recession, as ever, had its greatest impact on the very poor. This heightened vulnerability led to greater change of residence, to less family stability, and so on and on. The ability of mothers to profit from the treatment, in the midst of the many stresses they experience, is a marked tribute to their inner strength.

What is the worth of such modest intervention efforts? Some positive and lasting effects were demonstrated. Thus the treatment may recommend itself as one of many approaches helpful in enabling low-income families to come closer to realizing their hopes and aspirations. It is no substitute for meeting the economic and social needs of the poor, but in conjunction with other approaches it could be of positive benefit. Although the Family-Oriented Home Visiting Program addresses itself to one problem only, that particular problem is high among the concerns of families living in poverty: What will happen to the

children? Will their lives be merely a repetition of what the parents have themselves experiences, or is there an opportunity for the children to have a better life? If the approaches used in this study can enable parents to learn ways to help their children toward more effective functioning, then such interventions are a productive investment for society.

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Table 1

Layout of Instrument Administration

	Pretest	Posttest 1	Posttest 2	Posttest 3
BAYLEY	x	x		
BINET		x	x	x
RLT	x	x		
SLOSSON	x	x	x	x
HOME	x	x	x	x
MTSI	x	x	x	

[1] Target children were given either the Bayley or the Binet as age-appropriate.

Table 2

Stanford Binet Test Results with Target

Children as Blocked on Pretest Bayley Mental Index Scores

Groups	EHV				MOHV				Control			
	Hi		Lo		Hi		Lo		Hi		Lo	
	12		8		5		9		10		7	
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD
Posttest 1	93.9	14.6	77.9	6.1	96.0	6.7	80.6	14.1	80.0	8.4	78.7	14.1
Posttest 2	96.5	15.1	86.3	6.4	98.0	12.5	87.0	15.2	91.0	7.2	78.0	15.1
Posttest 3	98.5	19.0	85.7	7.5	96.5	15.3	90.4	11.3	90.3	10.3	85.7	14.5

Table 3

Home Observation for the Measurement of Environment

Groups	EHV (N = 11)		MOHV (N = 9)		Control (N = 11)	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Pretest	30	5.2	30	8.2	29	8.8
Posttest 1	34	10.4	30	7.1	30	13.6
Posttest 2	34	4.7	33	5.4	29	4.6
Posttest 3[a]	53	11.6	49	14.4	45	11.3

[a]Form for children 3-6

Table 4

The Maternal Teaching Strategy Instrument:
Use of Cue Labels

Groups	EHV (N = 20)		MOHV (N = 15)		Control (N = 16)	
	Mean	SD	Mean	SD	Mean	SD
Pretest	23	13.9	27	10.7	24	15.3
Posttest 1	42	11.7	42	8.5	35	17.4
Posttest 2 (target child)	41	9.0	38	7.3	32	12.8